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III. "On the Synthesis of Acetic Acid." By J. A. WANKLYN,
Esq. Communicated by Dr. E. FRANKLAND. Received
April 27, 1859.

I have elsewhere* shown that a salt of propionic acid results when carbonic acid is brought into contact with a compound consisting of ethyl and an alkali-metal. Guided by a well-known principle, I also inferred that an analogous reaction is common to the whole vinic series.

Believing, however, that it was desirable to investigate other members of the series, I have since undertaken the case of the corresponding methyl-compound, and find that it fully bears out the law, as will be manifest from the following details.

Some sodium-methyl in mixture with zinc-methyl, zinc, sodium, and ether was obtained by acting with sodium upon a strong ethereal solution of zinc-methyl. The product so obtained was divided into two portions—one of which was exposed to the action of a current of dry carbonic acid, and the other reserved for comparison.

During the transmission of carbonic acid, the sodium-methyl became hot. After the completion of the reaction, the resulting solid was treated with a little mercury, in order to convert any free sodium into an amalgam, which would not decompose water with too great violence.

Subsequent distillation of the product, with excess of dilute sulphuric acid, yielded a distillate having most distinctly the smell and taste of acetic acid. This acid distillate was redistilled, when it proved to be free from sulphuric acid.

Some of it was converted into a silver-salt by digestion with oxide of silver. This silver-salt was dissolved in hot water, filtered hot, and allowed to crystallize on cooling. An abundant crop of crystals separated, which was drained from the mother-liquor, the employment of a filter being avoided. The crystals were afterwards dried *in vacuo* over sulphuric acid until they no longer lost weight.

Determinations of silver were made by ignition, the resulting silver being reheated and reweighed until it remained constant.

* See Quarterly Journal of the Chemical Society, July 1858, page 130.

I. ·0894 gramme of the salt gave ·0580 gramme of metallic silver.

II. ·1597 gramme of the salt gave ·1022 gramme of metallic silver.

Comparison of these results with the composition of acetate of silver gives as follows :—

| | Calculated. | Found. | |
|--------------------------------|-------------|--------|-------|
| | | I. | II. |
| Per-centage of Silver. | 64·67 | 64·88 | 64·00 |

which leaves no doubt as to the presence of acetic acid.

Still further proof of the same was obtained by converting a little of the acid into a soda-salt, and heating it with arsenious acid. Abundance of kakodyl was evolved.

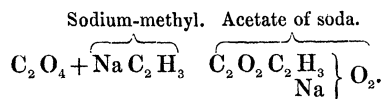
In order to remove any doubt which might exist as to the source of this acetic acid, and to show that it did not arise from oxidation of the ether which accompanied the sodium-methyl, I operated upon some of the original sample which had never been exposed to carbonic acid, and which, as previously mentioned, had been laid aside for comparison.

I mixed it with a little mercury, distilled with excess of dilute sulphuric acid, and digested the redistilled distillate with oxide of silver, using the same samples of acid and of oxide of silver as in the former experiment.

The distillate neither smelt like acetic acid, nor yielded acetate of silver on spontaneous evaporation to dryness *in vacuo* of its product with oxide of silver. Neither could kakodyl be obtained on heating its soda-residue with arsenious acid.

From all which it is evident that the acetic acid obtained must have been the product of the action of carbonic acid. The following conclusion is, therefore, established :—

Dry carbonic acid is decomposed by sodium-methyl with evolution of heat, and production of acetate of soda.



I hope also to be able to present shortly an account of the action of carbonic acid on one of the higher compounds of the alkali-metals—most probably on potassium or sodium-amyl.